

# Instructions for use

**READ THESE INSTRUCTIONS BEFORE USE**

**Keep these Instructions in a safe convenient place for future reference. Read in conjunction with the relevant Publication detailed in the preliminary information section.**

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## 2. TECHNICAL DATA

### GENERAL

Equipment - High power electrosurgical unit with monopolar and bipolar outputs

Type - Portable

### DIMENSIONS

Width	..	..	..	..	..	34.5 cm
Height	..	..	..	..	..	20.0 cm
Length	..	..	..	..	..	42.5 cm
Weight	..	..	..	..	..	17 kg

### ELECTRICAL DATA

(Note: Voltage factory set by transformer tapping, according to model supplied.)

Power Supply 230V a.c., 50-60Hz  
or 220V a.c., 50-60Hz  
or 110V a.c., 50-60Hz

Current (max.) 3.1A(230V)  
or 3.4A(220V)  
or 6.9A(110V)

Fuse rating (230V and 220V): 250V, T5A

Fuse rating (110V): 100-120V, T10.0A

Fuse type: 20 mm to IEC 127

### MONOPOLAR

Carrier frequency - 475kHz nominal, square wave.






Power control - Variable amplitude set by front panel controls. Preset pulse patterns set by mode switches.

Load impedance for maximum output power - 200 ohms

Impedance test load - 200 ohms

### OUTPUT (Monopolar)

Output powers are measured to an accuracy of  $\pm 20\%$ , with a maximum power of 400 Watts.

			Peak Open Crest Circuit	
Function	Power	factor	Voltage	
 Normal cut	400W $\pm 20\%$	1.3	1200	
 Blend	300W $\pm 20\%$	2.4	1800	
 Specialist cut	350W $\pm 20\%$	1.9	1700	
 Pinpoint coag.	150W $\pm 20\%$	3.0	2000	
 Spray coag.	80W $\pm 20\%$	9.0	3800	

### BIPOLAR

Carrier frequency - 785kHz nominal, square wave.

Power control - Variable pulse group modulation set by front panel control. Amplitude set by Hi/Lo range button.

Load impedance for maximum output power - 100 ohms

Impedance test load - 100 ohms

Forceps switching circuit - Initial delay time up to 2 seconds (rear panel control)

Tissue switching resistance - 470 kohm (nominal)

### OUTPUT (Bipolar)

Function	Power	Peak Open Crest Circuit factor Voltage	
Coagulation			
High range	50W $\pm 20\%$	Variable	350
Low range	15W $\pm 20\%$	Variable	200

### AUDIBLE INDICATORS

Cut or Blend running tone\*

– High .. .. 950Hz (approx.)

Coagulation running tone\*

– Medium .. .. 800Hz (approx.)

Bipolar running tone\*

– Cut .. .. 900Hz (approx.)

Bipolar running tone\*

– Coagulation .. .. 730Hz (approx.)

Alarm – High/low, two-note at maximum volume

Touch button 'bleep'\*

– indicates when a function button is pressed

\* = Adjustable volume

### VISUAL INDICATORS

Three separate 20 segment bargraph displays indicate nominal available power in Cutting, Coagulation and Bipolar modes.

Power output 'on' indicators for:

Cutting modes Yellow lamp  
Coag modes Blue lamp  
Bipolar mode White lamp

### 3. SAFETY NOTES

**Attention to the following points will prolong the life and efficiency of your electrosurgical unit and will help to avoid the risk of accidents, or damage:**

#### DO:

- ◆ Read the instructions carefully before using the electrosurgical unit. Keep this instruction manual close-to-hand.
- ◆ Switch off and disconnect from the mains electrical supply prior to cleaning the equipment.
- ◆ Use Eschmann accessories, in particular cables, which should preferably be no more than 3 metres in length.
- ◆ Use bipolar techniques in preference to monopolar, whenever possible. For surgical procedures on parts of the body having a relatively small cross-sectional area, the use of bipolar techniques may be desirable to avoid unwanted coagulation.
- ◆ Seek advice of Cardiology Department before using the equipment on patients with implanted pacemakers. Monitor such patients carefully.
- ◆ Use a quiver (REF 83-186-38) to hold active accessories when not in use.
- ◆ Use only insulated forceps.
- ◆ Use 4 mm or 8 mm plug type active cables in preference to hook type cables.
- ◆ Set power output controls to minimum setting before use.
- ◆ Use minimum power setting to achieve the desired effect.
- ◆ Grasp the connector(s) not the cable when disconnecting cables from the equipment.
- ◆ Check all cables and accessories routinely before use.
- ◆ Use monitoring systems incorporating high frequency current limiting devices.
- ◆ Contact the hospital electronics engineer or Eschmann After Sales Service Department if the equipment fails to function after checking.
- ◆ Ensure the equipment is serviced regularly. Contact Eschmann After Sales Service Department for details.

#### DO NOT:

- ◆ Do not use uninsulated forceps.
- ◆ Do not use other than Eschmann accessories.
- ◆ Do not place monitoring electrodes close to the operating site. When high frequency surgical equipment and physiological monitoring equipment are used simultaneously on the same patient, any monitoring electrodes should be placed as far as possible from the surgical electrodes. Needle monitoring electrodes are not recommended. In any case, monitoring systems incorporating high frequency current limiting devices are recommended.
- ◆ Do not allow active cables to drape across the patient's body or to contact the cables of other equipment.
- ◆ Do not use flammable anaesthetics or flammable solvents.
- ◆ Do not allow the patient's body to touch conductive objects. The patient should not come into contact with metal parts which are earthed or which have an appreciable capacitance to earth, e.g. operation table, supports, etc. The use of antistatic sheeting is recommended for this purpose.
- ◆ Do not use hook type active cables, if possible.
- ◆ Do not use hook type adapters for active cables.
- ◆ Do not reuse disposable plate electrodes.
- ◆ Do not rely solely on surgical gloves to provide insulation.

## 4. INTRODUCTION

### GENERAL

4.1 The TD411-RS electrosurgical unit provides outputs for high power monopolar cutting, and coagulation, together with separate outputs for bipolar coagulation. The unit incorporates touch button controls and light emitting diode (LED) visual displays and indicators.

### OPERATING MODES

#### Monopolar

4.2 Monopolar operating mode offers a choice of fingerswitch or footswitch control of 'Cut' or 'Coag' outputs. The first using the Eschmann two-button fingerswitch, the second using an active electrode handle in conjunction with one of a range of electrical footswitches. Monopolar or bipolar selection can be hand-controlled using touch buttons, or foot-controlled using a black footswitch.

#### Bipolar

4.3 Bipolar coagulation is an efficient method of effecting haemostasis, and for closure of vessels such as Fallopian tubes. It is extremely safe to use, as the current path is between the tips of the bipolar forceps and the tissue held between them is directly in view of the surgeon at all times.

4.4 A plate electrode is not required and safety is increased even further by a two-range power output control system allowing precise setting of the power output.

4.5 The bipolar mode of operation also offers a choice of two control modes, selected by panel touch buttons in the bipolar zone.

### ACCESSORIES

4.6 The equipment is designed to be used with the Eschmann range of active, plate and bipolar cables, certain other types of cables with American pattern connectors may also be used. The front panel is colour coded relative to the footswitches (WHITE for bipolar, YELLOW for cut and blend, and BLUE for coagulation).

### ASSOCIATED PUBLICATIONS

4.7 This Manual contains preparation for use, and operation instructions only. For a detailed

technical description, together with complete maintenance procedures including illustrated parts list refer to the TD411-RS Service Manual E-SM38.

### EQUIPMENT CERTIFICATION

4.8 The electrosurgical unit fully complies with the major international safety standards (see Technical Data).

#### CAUTION

**The electrosurgical unit is to be operated by medically qualified personnel only.**

### ELECTROSURGICAL TECHNIQUES

#### General

4.9 When using electrosurgery, it must always be remembered that its purpose is to cut, destroy or modify tissue. This can occur at any point on the body where the concentration of electrical current becomes sufficiently high. Under fault, or misuse conditions, this current concentration can occur on points on the body other than the desired operation site and can cause burns.

4.10 To help reduce the possibility of such accidental burns, the unit is fitted with a leakage limiting circuit in the monopolar section. This circuit detects the conditions that may lead to an increased possibility of accidental burns from leakage and limits the leakage current accordingly. The HF leakage limiter does not generate an alarm. In addition, the following paragraphs give guidance for the safe use of the electrosurgical unit.

4.11 With monopolar electrosurgery, the surgeon uses a single point electrode to concentrate high frequency electric current in the body tissues close to the electrode tip. If the operating site is linked to the bulk of the body only by a tissue path of small cross-sectional area, e.g. Fallopian tube or penis, the surgical effect of the electrosurgery can extend along it from the electrode with undesirable results.

4.12 Normally the surgeon will have ensured that the operating site is bounded by a bulk of tissue into which the current can disperse, so that the cutting or coagulating effect is limited to the tissues close to the electrode. The current then

## 4. INTRODUCTION

### **Active Cables**

4.20 Only active cables supplied by Eschmann should be used. This is of particular importance, as cables with inadequate insulation can cause burns due to insulation failure.

4.21 It is good practice to ensure that active cables are correctly positioned when in use and are not allowed to drape across the patient's body or across other cables.

4.22 Active cables of the 'hook' type have been replaced by pin or jack plug designs (REF 83-135-12 or 83-138-06) both of which are suitable for use with this unit. The absence of exposed metal parts ensures freedom from operator burns with the present design of cables.

4.23 Active cables 3 metres long should be used in normal situations, even if it means repositioning the electrosurgical unit. Longer types, of 5 metres or more, should only be used where the electrosurgical output is a fixed distance from the operation table, e.g. with certain types of pendant supply, or with lamina airflow curtains. Longer cables increase the risk of electrical or mechanical hazard.

### **Active Electrodes**

4.24 The correct type of active electrode should always be used. Electrodes should be kept clean during use either by wiping with a solvent on a sterile swab or by using a sterile abrasive pad. Ball type coagulation electrodes should be discarded if the surface becomes pitted. Do not sterilize electrodes which are designed as 'single use disposable'.

### **Fingerswitches**

4.25 For many procedures, 'on/off' control of cutting and coagulation outputs by means of buttons on a fingerswitch offers the surgeon more precise control. Re-usable fingerswitches have only a limited number of re-sterilization cycles. Regular testing and inspection is therefore essential. Do not sterilize and re-use 'single use' types.

4.26 Do not connect footswitches to the electrosurgical unit when a fingerswitch is in use.

### **Power Control**

4.27 Use only the minimum power control setting necessary to produce the desired electrosurgical effect. If in doubt start at a low setting and increase the output in small steps until the desired effect is produced.

4.28 If, during a procedure, the output appears to drop or the electrosurgical performance decreases, stop and check the plate electrode for correct application and connection before increasing the control setting. Also check all active connections.

4.29 If only one type of output is required, i.e. 'cut' or 'coagulation', it is good practice to set the other output controls to zero.

### **Current Paths**

4.30 The path of an electrosurgical current through a patient's body should, whenever possible, be the shortest path. If it is suspected that this path could be by-passed, for example between limbs, an insulating medium should be used.

4.31 It is advisable that skin to skin contact between parts of the patient's body, for example between the arms and the trunk, should be avoided. Dry gauze or other material should be used to provide separation.

### **Accidental Contact**

4.32 Do not allow contact to occur between any part of the patient's body and any metal or conductive material, such as parts of the operation table, anaesthetic screens or drip stands.

### **Bipolar Electrosurgery**

#### **General**

4.33 Bipolar coagulation provides a very safe and precise means of controlling bleeding in many types of surgery, and can be used in conjunction with monopolar techniques where cutting, or higher coagulation powers are required.

4.34 With bipolar techniques, the electrosurgical current flows only between the tips of the bipolar forceps or between the contact points of a special purpose electrode and therefore does not require

## 4. INTRODUCTION

### WARNING

**More severe consequences, local heating and destruction of the pacemaker circuit (Reference <sup>1</sup>), would result if the electrosurgical electrode touched the pacemaker.**

### Electrosurgical Interference

4.44 Electrosurgical equipment can produce interference with other electromedical apparatus used in the operating theatre. Particular attention should be given to the selection of ECG monitors with good interference rejection if it is desired to monitor the patient when the electrosurgical equipment is active.

4.45 In certain conditions a reduction in ECG interference can be obtained by placing the ECG electrodes closer together than normal. Modern monitors with high input isolation allow electrode placement close to the electrosurgical plate electrode, if required.

4.46 It is inadvisable to use mobile telephones or 'walkie-talkie' equivalent equipment close to electrosurgical or any other medical electrical equipment.

4.47 To minimize the possibility of electrical interference from an arc, between the active electrode and the patient, affecting the TD850, it is good practise, in common with all electrosurgical units, to keep them as far as is reasonably possible from the surgical site.

### Using Two Electrosurgical Units

4.48 In certain procedures it is convenient or even essential that two electrosurgical units are used on the patient at the same time. There is no reason why such operations should not be safely carried out if the following points are observed:

- ◆ Do not use a fully floating output unit with an earth referenced unit or even a partially floating unit, for example:
  - ◆ Eschmann TD411 or DS402 and a Valleylab Force 4
  - ◆ Eschmann TD411 or DS402 and a GU Solstar or any older GU unit.

### Note:

All Eschmann units have fully floating outputs and any two may be used in combination.

- ◆ Always use two plate electrodes, one for each unit. Never join plate cables or overlap plates.
- ◆ Position each plate as close as possible to the respective operation site. Do not allow electrosurgical current paths to intersect, e.g. if the main procedure is in the thoracic region, the plate for this unit should be placed on the patient's back, buttocks, or upper thigh. If the secondary procedure is vein removal from the leg, the second plate should be placed on the thigh or calf of this leg.
- ◆ For maximum safety use fingerswitches wherever possible. This reduces the possibility of inadvertent activation of either unit's output. Always use two quivers, one for each active handle or fingerswitch.

### SERVICING

4.49 It is recommended that electrosurgical safety checks and routine servicing are carried out at regular intervals and only by Eschmann trained personnel or hospital engineers, otherwise the warranty could be infringed.

4.50 Read the information given in this Manual carefully before using, cleaning, sterilizing, or servicing the electrosurgical unit.

### References

- <sup>1</sup> 'Optimal resources for implantable cardiac pacemakers' (Section on electromagnetic interference) - a report by the Inter-Society Commission for Heart Disease Resources, published by the American Heart Association in their journal 'Circulation' (1983), 68(1):232A-233A.
- <sup>2</sup> 'Electrosurgical device interference with implanted pacemakers' - a question and answer section of the 'Journal of the American Medical Association'. (1978), 239(18:1910).



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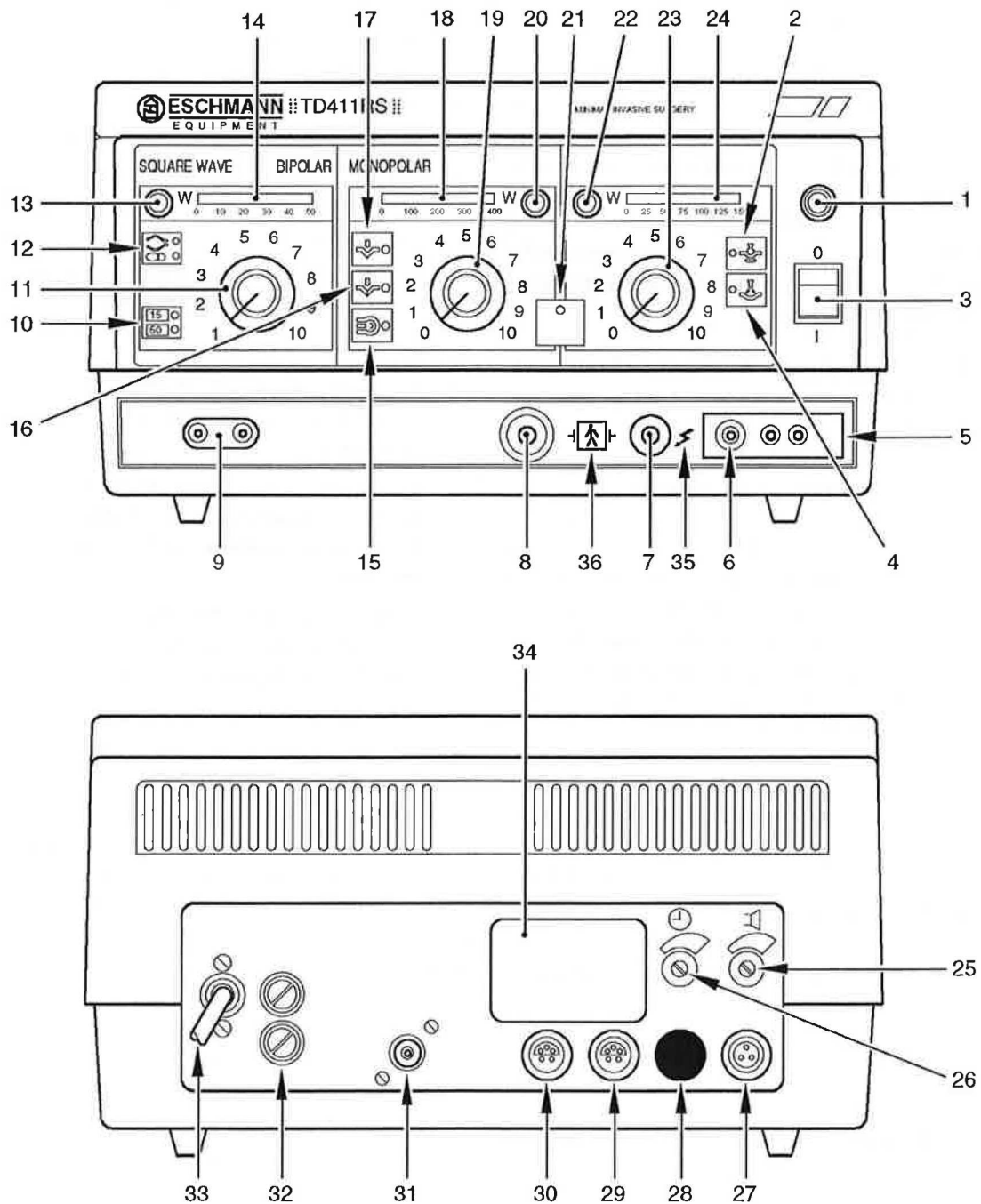


Fig. 2TD411-RS Electrosurgical Unit - Controls and indicators



## 5. OPERATION

- ◆ For foot control, use one of the range of Eschmann footswitches (Fig. 12) together with a non-switching active handle (Fig. 8).

### WARNING

**When a fingerswitch or hand controlled active handle is in use, the footswitch(es) must be disconnected from the electrosurgical unit.**

5.4 If required, the monopolar/bipolar changeover black footswitch (Fig. 12) should be connected to either socket (29) or (30). This provides a monopolar/bipolar changeover facility under the control of the surgeon, without using panel controls (10) and (21).

### CAUTION

**For safety, when using only one monopolar mode, set the unused output control to '0' e.g.**

- ◆ For coagulation only, set 'cut' control (19) to '0'.
- ◆ For cut/blend only, set 'coag' control (23) to '0'.

### SYSTEMS CHECK (Figs. 2)

### WARNING

**If the unit fails any of the following checks it must not be used until the faults have been repaired and the checks have been successfully repeated.**

5.5 Connect unit to mains power supply, and if the supply socket is controlled by a switch, ensure that it is switched 'on'. Select mains switch (3) to 'I' (on). Green pilot lamp (1) will come 'on'.

5.6 Press monopolar selector touch button (21). The amber button indicator will come 'on'.

5.7 Select normal 'cut', 'blend', or 'specialist cut', at touch buttons (17) (16) or (15) respectively in the cutting zone, and 'pinpoint coag', or 'spray coag' at touch button (2) or (4) respectively in the coagulation zone. Check correct selection is indicated by appropriate amber button indicators.

**Note:** The degree of haemostasis increases with 'blend' selected while the speed of cutting is reduced. For maximum cutting speed, particularly in urology, it is recommended that 'specialist cut' is selected.

5.8 Set 'cut' and 'coag' power output controls (19) and (23) respectively to required levels. Note

that power displays (18) and (24), only operate in monopolar mode.

5.9 Activate unit by:

- ◆ Pressing a fingerswitch 'cut' or 'coag' button.
- ◆ Pressing the appropriate footswitch, yellow for 'cut', blue for 'coag'.

### Notes:

- ◆ Blend output is obtained only by pressing the fingerswitch yellow 'cut' button or the yellow footswitch.
- ◆ Yellow and blue pilot lamps (20) and (22) respectively will come 'on', and the running tone will be audible only when the output is active, and the control(s) are set at more than 1.5.
- ◆ Monopolar mode, and type selection are stored in the unit's memory during power-off periods and will not need reselecting when power is reapplied. Correct button action is indicated by the button 'bleep' tone.

### Alarms

#### Alarm Conditions

5.10 An audio-visual alarm, with two-tone and bar displays flashing at one second intervals, will operate if:

- ◆ The plate electrode is not connected to the unit.
- ◆ The plate electrode and/or cable is faulty.
- ◆ A split plate cable is plugged into the unit and the split plate is not making a sufficiently good contact with the patient's body.
- ◆ A low impedance path exists between the patient's body and earth. This condition can be caused by the presence of an earthed ECG electrode, or by an accidental contact between the patient's body and a conductive object such as part of the operation table or a drip stand.
- ◆ The voltage on the plate is at a dangerously high level (PVM alarm see section 1.1).

In any alarm mode, all outputs are inhibited and alarm volume is maximum, regardless of volume control setting

5.11 If more than one input demand is received at the same time (such as two footswitches or a footswitch and a fingerswitch button being

## 5. OPERATION

### Remedy:

- (i) Check for accidental direct contact between patient and an earthed object, (drip stand or conductive part of operation table).
- (ii) If applicable disconnect suspect ECG electrodes from monitor.
- (2) The alarm will operate if the bipolar pneumatic footswitch and the bipolar electrical footswitch are pressed simultaneously.
- (3) The alarm will also sound if both the 'cut' and 'coag' footswitches, or if one of the two footswitches and a fingerswitch button are pressed simultaneously. The circuit will automatically reset when the double activation stops. This is an important safety feature and applies to any combination of foot and finger switches.
- (4) If unit alarms as soon as output is activated and none of the above remedies are successful, the EPM is likely to be the cause and Eschmann Equipment should be contacted.
- (5) If none of the above remedies stops an alarm, contact Eschmann Equipment and do not use the unit.

### OPERATING NOTES

#### Monopolar Mode (Fig. 2)

#### *Plate Electrode (Required for Monopolar Mode Only) (Fig. 3, 4 & 5)*

5.14 If the electrosurgical unit is selected to monopolar mode and a plate electrode is not connected to socket (8), the unit will alarm and the audible two-note tone and flashing bar displays shown on Fig. 2, will operate. If a non split plate cable is being used, then connecting a plate electrode will stop the alarm. If a split plate cable is being used then connecting a split plate and applying the split plate correctly to the patient's body will stop the alarm.

5.15 A plate monitoring circuit initiates the audio-visual alarm system if there is a break in the plate electrode cable, or a faulty connection in the plate electrode circuit. The electrosurgical output will be instantly cut off and will not be restored until the fault is corrected.

5.16 If a split plate cable and split plate are being used, the unit will alarm if the split plate is not making sufficiently good contact with the patient's body or if the split plate or its connector system is faulty.

5.17 Apply a plate electrode (Figs. 3, 4 & 5) to the patient in strict accordance with the application instructions supplied with the plate and connect the plug to the plate socket (8) on the front panel of the unit.

**Note:** The Eschmann Flexoplate must be used with adapter REF 83-207-56.

### WARNING

**Whichever type of plate electrode is used, it is most important that the application instructions, issued with the plate, are strictly followed.**

5.18 If the required surgical effect is not obtained with the normal power setting, check that:

- ◆ The plate electrode is correctly positioned, and is in direct contact with the patient.
- ◆ The plate electrode cable is intact, and is plugged into unit plate socket (8).
- ◆ The active electrode is correctly fitted in its holder and that the active cable is correctly connected. Check that the cable is in good condition.

Guidance on power output settings is given in section 5.46.

#### *Fingerswitch/Active Electrode Handle*

5.19 A fingerswitch (Fig. 6) or active electrode handle (Fig. 7 & 8) must be treated with extreme care at all times.

### WARNING

**When either a fingerswitch or an active electrode handle is connected to the unit, its location should be closely noted. It should never be allowed to contact other instruments. During surgery, when an active electrode is not in use, it should always be put in an electrosurgical quiver or similar receptacle. This is most important when both bipolar and monopolar electrodes are required for the same surgical procedure.**

## 5. OPERATION

### Bipolar Mode (Fig. 2 and Figs. 20 to 22)



5.30 Select bipolar forceps (Fig. 10) to suit the surgical procedure, and plug them into the bipolar forceps cable. Connect the cable to 4 mm sockets (9).

#### CAUTION

**Set output control (11) to '1'. (see section 3)**

5.31 Connect the unit to the mains power supply and switch it 'on'. Select mains switch (3) to 'I' ('on') and check that green pilot lamp (1) comes 'on'.

5.32 Press bipolar selector touch button (10) to select bipolar mode. Alternate selections of touch button (10) give 15W (low) or 50W (high) power range as shown by the amber indicator buttons.

5.33 Select control mode at touch button (12). Alternate selections give  (forceps switching) or  (footswitch switching) modes of operation as indicated by the amber indicator buttons.

5.34 A white pneumatic or white electric footswitch (Figs. 11 & 12) must be connected to the unit whenever bipolar coagulation output is required, irrespective of the control mode indicated at touch button (12, Fig. 2).

5.35 Set power output control (11) to required level. Note that power display (14) shows the maximum available output power for either power range.

#### Notes:

- ♦ Pilot lamp (13) will come 'on' and the running tone will sound only when the output is activated.
- ♦ Bipolar mode, power range, and forceps or footswitch switching function selections are stored in the unit's memory during power-off periods and will not need reselecting when power is reapplied.
- ♦ The 15W (low) range should be used initially if the power level required is not known.
- ♦ The method of 'constant amplitude' power control provides very effective coagulation at low power levels.

### Changing Forceps

5.36 To change the type of forceps during use, e.g. from bayonet to straight, set mains switch (3) to '0' ('off') change forceps, and then switch to 'I' ('on').

### Selecting Bipolar Forceps

5.37 Any type of forceps from any manufacturer can be used if they are designed for bipolar use (legs of forceps electrically isolated). Many types will plug directly into the Eschmann cable connector shown in Fig. 10. Other types with round pin or flat blade connectors should be used with the cable and connector available from the respective forceps manufacturer. Always use fully insulated forceps to ensure totally reliable operation of the forceps switching system, and complete safety for the operator and patient. Do not use direct switched forceps, three core type.

### Footswitches

5.38 Two types of footswitches can be used in bipolar mode:

- ♦ A white pneumatic footswitch (Fig. 11) which is a light-action bellows type, with a push-on connector tube.
- ♦ A white electric footswitch (Fig. 12).

5.39 The type of footswitch used is a matter of personal choice. The pneumatic type has a very light action and is suited to procedures where repetitive actuation is needed.

#### Note:

- ♦ Only one bipolar footswitch should be connected to the unit at any time.
- ♦ With footswitch mode selected there is no 'time delay' or 'maximum on-time'. Continuous bipolar output is available all the time the footswitch is pressed.
- ♦ The bipolar power display (14) only operates in bipolar mode.

### Forceps Switching Output Control (Fig. 2)

5.40 Forceps (automatic) switching is a hand and footswitch operated system for output control. The white footswitch must be kept pressed by the surgeon or his assistant during periods of bipolar use (see section 5.34). This mode of

## 5. OPERATION

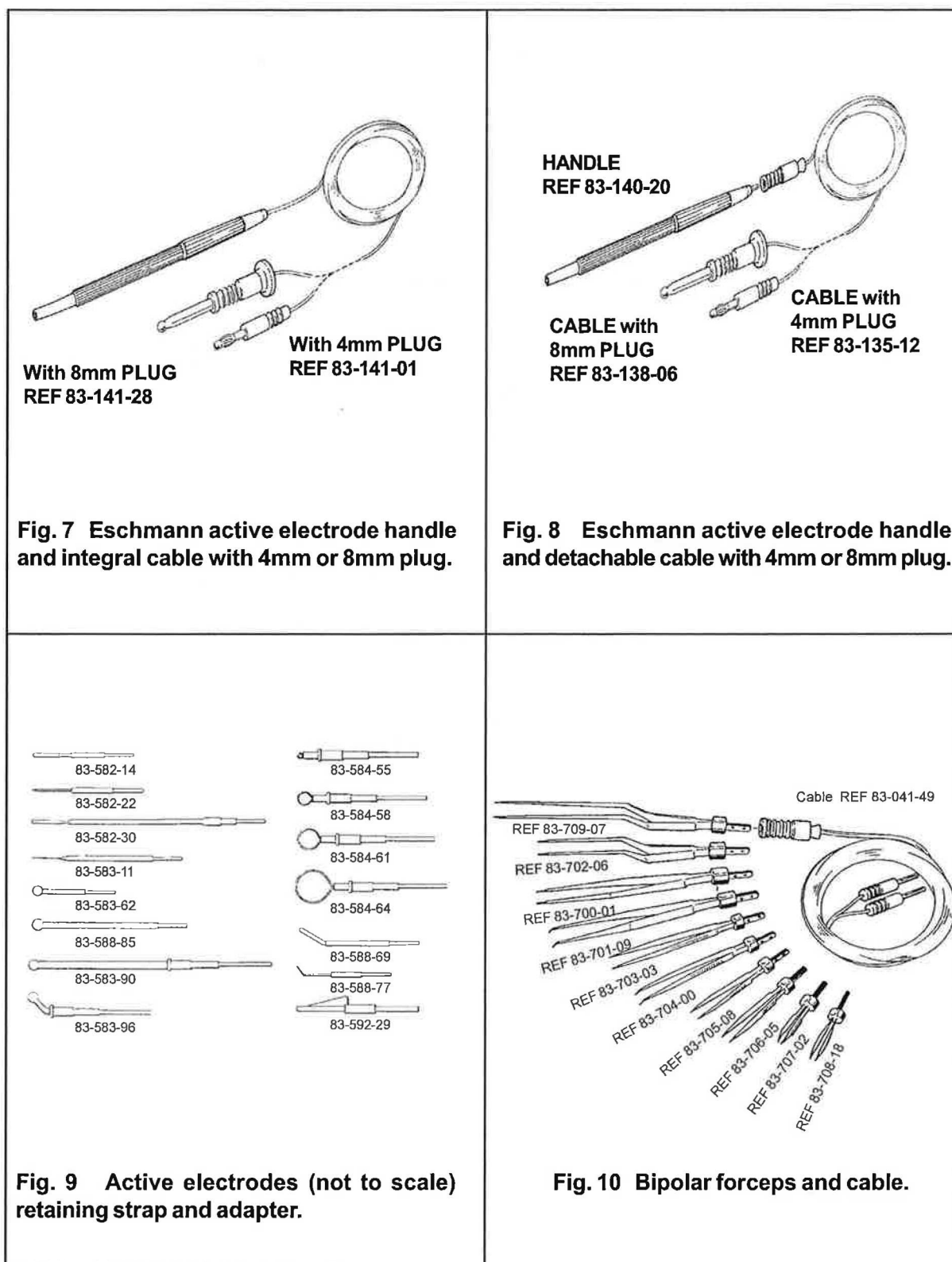
**Table 1 Power Output Selection Guide**

Procedure	Mode	Condition	Setting (Watts)
<b>CAUTION</b> <b>Do not use a higher power setting than is necessary</b>			
General	Normal Cut	Dry field	100 to 120
	Pinpoint Coag	Dry field	50 to 75
	Blend	Dry field	75 to 100
Cardiothoracic	Normal Cut	Wet field	100 to 120
	Pinpoint Coag	Wet/dry field	60 to 90
Sternal oozing	Spray Coag	Wet/dry field	40 to 60
Intercostal muscle	Spray Coag	Wet/dry field	40 to 65
Gynaecology LLETZ (Large Loop Excision of the Transformation Zone)	Blend	N-TZ (Displasia CIN I)	75 to 100
	Spray Coag		45 to 55
	Blend	L-TZ (CIN I to II)	80 to 110
	Spray Coag		55 to 60
DEXC (Diathermy Excision of the cervix)	Specialist Cut	L-TZ (CIN II to III)	60 to 65
	Spray Coag	Microinvasive	50 to 60
	Specialist Cut	TZ Identification	50 to 65
TCRE: TCAE (Transcervical Resection of the Endometrium): (Ablation)	Blend	Normal endometrium	90 to 100
	Specialist Cut	Spongio-endometrium	50 to 65
	Blend	Suspect fibroid inv.	100 to 115
	Spray Coag	Fundal ablation	55 to 65
Urology	Specialist Cut	Spongio-prostate	160 to 180
		Fibro/Muscular pros.	180 to 200
	Normal Cut	Bladder tumour	160 to 185
	Spray Coag		45 to 60
	Pinpoint Coag	Ball electrode	75 to 100
Plastic/burns	Spray Coag	Eschar formation	45 to 50
Laparoscopic cholecystectomy	Blend	Dry/wet field	80 to 100
	Spray Coag	Liver bed bleeding	60 to 65

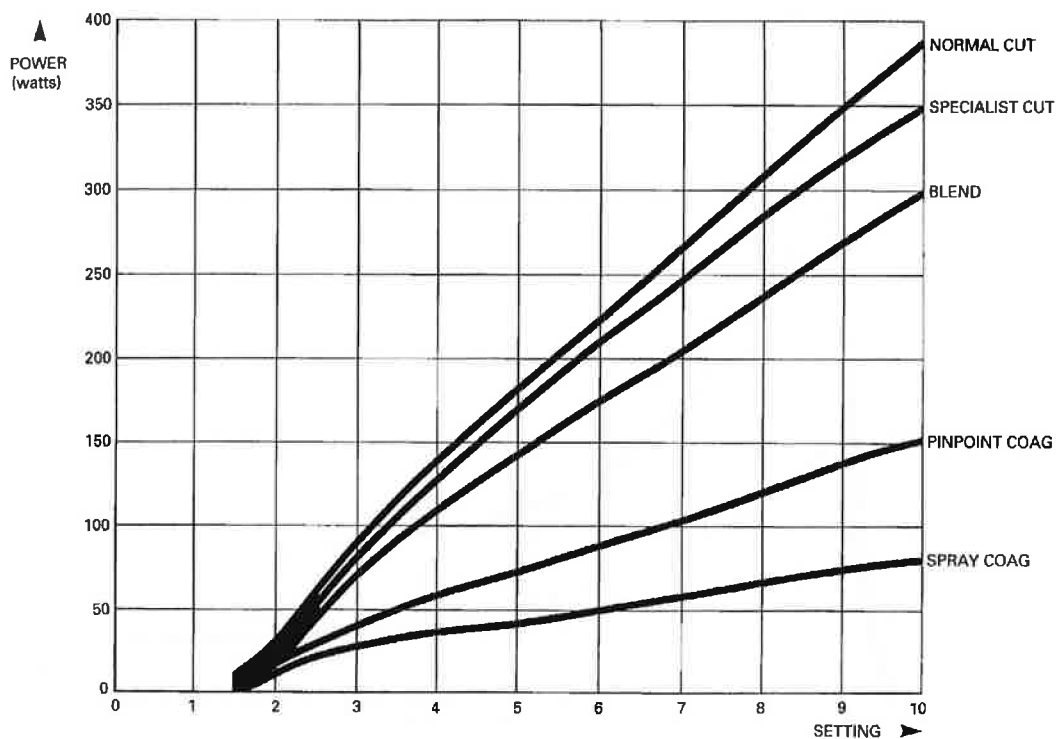
**Notes:**

- ◆ Monopolar blend output mode can be used with advantage in many cutting procedures, particularly when only a single (yellow) footswitch is being used.
- ◆ The blend mode produces less output power for a given control setting than normal cut, as shown on power display indicator (18, Fig. 2).

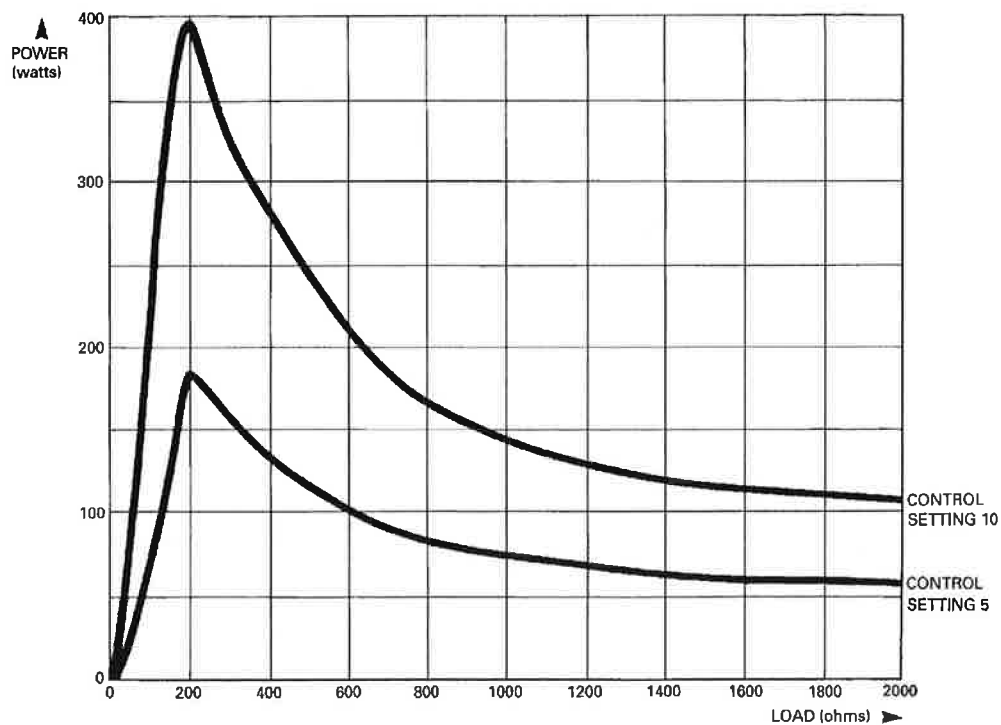
## 5. OPERATION



## 5. OPERATION



**Fig. 14 Monopolar Output Power ( $\pm 20\%$  and  $\leq 400W$ ) v Control setting.**  
Test load used 200 ohms.



**Fig. 15 Monopolar Normal Cut: Output Power v Load Impedance**

## 5. OPERATION

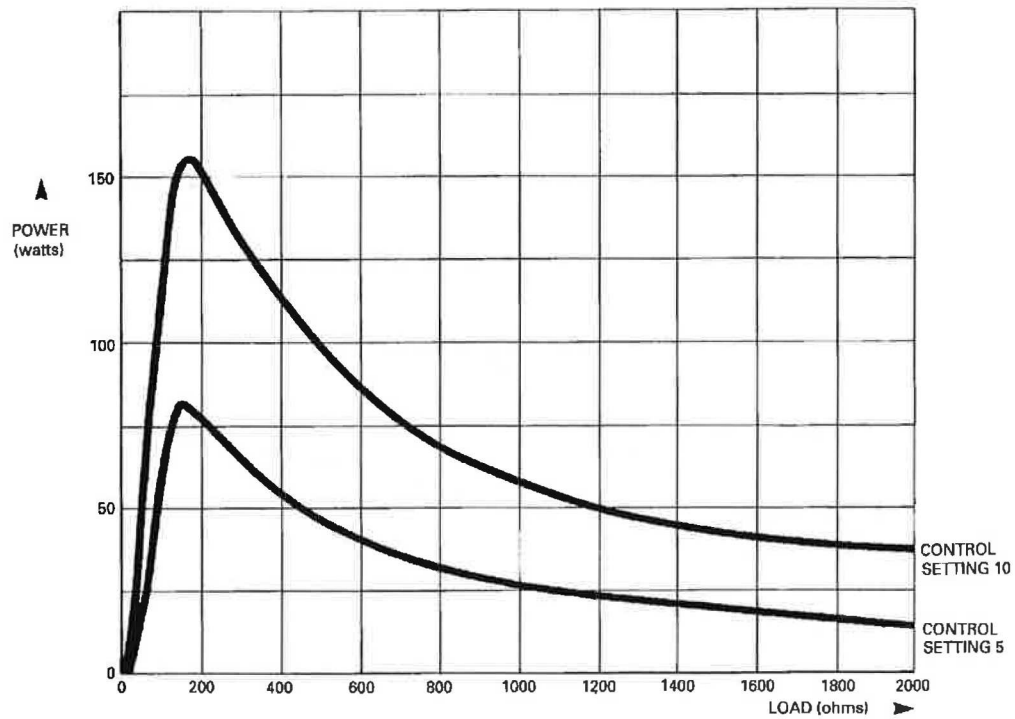


Fig. 18 Monopolar Pinpoint Coagulation: Output power v Load Impedance

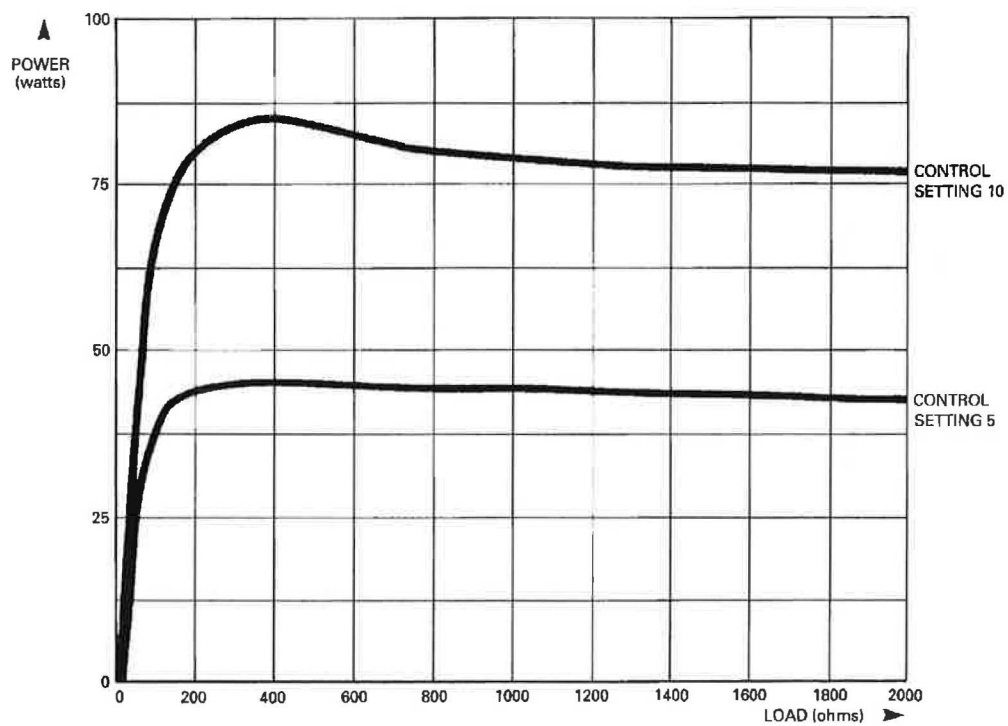


Fig. 19 Monopolar Spray Coagulation: Output Power v Load Impedance



## 5. OPERATION

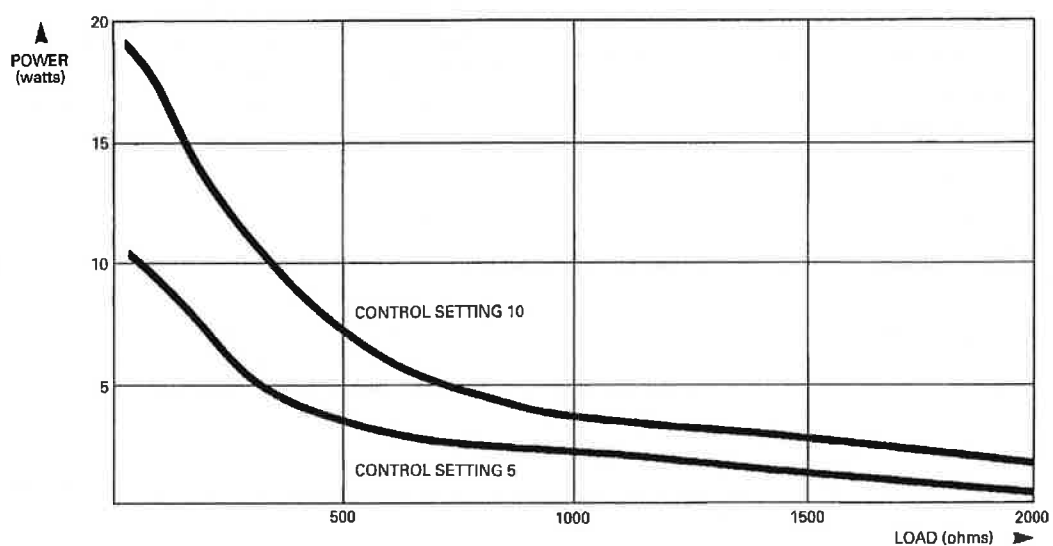


Fig. 22 Bipolar Low Power (15W) Range: Output power v Load Impedance

